Area Source Hazardous Air Pollutant Emissions

In Huntsville, Alabama

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Division of Natural Resources & Environmental Management

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I. INTRODUCTION

A. Overview

Prior to 1990, regulation of Hazardous Air Pollutants (HAPs) under the Clean Air Act was limited to only a handful of pollutants and a relatively narrow range of activities. A significant aspect of the Clean Air Act Amendments of 1990 (CAAA) was the tremendous expansion of the list of air pollutants identified as HAPs, and the number of facilities subject to regulation for the control of HAP emissions. National Emission Standards for Hazardous Air Pollutants (NESHAPs) promulgated under the authority of the 1970 Clean Air Act, as amended in 1977, regulated emissions of only eight Hazardous Air Pollutants. [1] In contrast, the 1990 Amendments to the Clean Air Act (CAAA) identified 189 HAPs (the list now includes188), and established an ambitious schedule for promulgation of technology-based emission control regulations.[2]

Another significant provision of the CAAA requires all Major Sources to obtain Operating Permits that include detailed monitoring and reporting requirements.[3] Consequently, as implementation of the Clean Air Act Amendments of 1990 has progressed, large numbers of Major Sources of HAPs have become subject to specific emission regulations, and have been issued Operating Permits. As a result, State and Local permitting authorities have amassed a great deal of information on the HAP emissions from the major sources within their jurisdictions. The availability of this information does not necessarily translate into convenient access, however, and summaries of HAP emission data (or HAP "emission inventories") are only now beginning to be developed on a widespread and systematic basis. Furthermore, these inventories tend to only include information that is readily available to State and Local air pollution control agencies, and therefore contain very little information on HAP emissions from non-major stationary sources or mobile sources.

The City of Huntsville Division of Natural Resources, a Local air pollution control agency with jurisdiction in the City of Huntsville, Alabama, has long maintained

[1] NESHAPs codified in 40 CFR part 61, the so-called "health-based NESHAPS" promulgated under the authority of the 1970 Clean Air Act, regulate emissions of radionuclides, beryllium, mercury, vinyl chloride, benzene, asbestos, arsenic and coke oven emissions.

[2] Under the 1990 Clean Air Act Amendments, EPA is required to promulgate Maximum Achievable Control Technology (MACT) Standards, the so-called "technology-based NESHAPs," to control HAP emissions from all "major sources" of HAPs, and selected area sources. A "major source" is defined as a facility with the Potential to Emit 10 Tons Per Year of any single HAP, or 25 TPY of all HAPs.

[3] Title V of the CAAA provides that all major sources must obtain an Operating Permit, and identifies the minimum elements that must be included in these permits. The implementing regulations are found in 40 CFR Part 70.

a criteria pollutant emission inventory.[4] This inventory includes emissions from permitted stationary sources as well as on-road mobile sources. Over the past several years, the Division has made a concerted effort to expand this inventory. The expansion reflects inclusion of speciated HAP emissions, and also reflects inclusion of a number of smaller, non-permitted "area sources" of Hazardous Air Pollutants. This document serves to describe the results of this effort to develop a HAP emissions inventory, and the methods employed in this project.

B. Background

In 1999, USEPA made a small amount of funding available to State and Local air pollution control agencies through grants awarded under § 105 of the Clean Air Act.[5] This "supplemental" grant award was earmarked for air toxics[6] characterization projects, but considerable flexibility was provided with respect to the types of projects eligible for funding. Thus, a State or Local agency could use the funds to conduct ambient air sampling and analysis for selected Hazardous Air Pollutants, or to perform HAP emission inventory work, or for some other activity proposed by the agency that reasonably furthered the goal of air toxics characterization. The Division of Natural Resources (DNR) received a very small amount of supplemental grant funding (roughly $ 6000), and was therefore limited in the types of projects that could be undertaken.

The funding awarded in 1999 was used to develop a fledgling HAP emission inventory, but the scope of the inventory was confined to those sources for which Huntsville already had available information. This universe of sources included Major Sources, for which DNR had detailed emissions data, including detailed speciated HAP emissions data. Although the HAP emissions data for the Major Sources had not yet been compiled into a major source HAP emissions inventory, this was rather straightforward and required relatively little time. In addition, the 1999 HAP emissions inventory development project included permitted minor sources, and regulated area sources. For these facilities, DNR had already compiled information on criteria pollutant emissions, material usage, operating rates, etc., but did not have detailed information on HAP emissions. The principal effort in this initial inventory development project thus involved speciating existing criteria pollutant emissions data, largely VOCs (Volatile Organic Compounds), and compiling this information into a HAP inventory. Permitted minor sources and regulated area sources include facilities subject to specific emissions limitations or control requirements under the City's Air Pollution Control Rules and

[4]Criteria pollutants are those six pollutants for which National Ambient Air Quality Standards have been established under Title I of the Clean Air Act, i.e. ozone, carbon monoxide, nitrogen oxides, sulfur dioxide, lead and particulate matter (consisting of "coarse particles" or PM_{10}, and "fine particles" or $PM_{2.5}$).

[5] § 105 of the Clean Air Act authorizes EPA to make grant awards for state and local air pollution control program support. See 42 USC § 7405.

[6]The term "air toxics" is less precise than the term "Hazardous Air Pollutants." It is a generic term that includes the pollutants identified as HAPs, but may also include other air pollutants that exhibit toxic effects.

Regulations, facilities subject to federal NSPS (New Source Performance Standards)[7] or area source NESHAPs, and facilities with sufficient emissions to warrant inclusion in DNR's criteria pollutant emission inventory.

As a result of the work performed under the 1999 supplemental grant, Huntsville had developed an initial stationary source HAP emissions inventory that included major sources, permitted minor sources, gasoline dispensing facilities and perchloroethylene dry cleaning facilities. The inventory reflected 1998 emissions of 19 HAPs. A Final Report was submitted to USEPA Region 4 in January 2000,[8] which included a description of the methodology employed in developing the inventory, as well as a summary table quantifying HAP emissions for the specified source categories.

In Fiscal Year 2000, DNR proposed to build on the work begun under the 1999 supplemental grant by significantly expanding the initial HAP inventory, and requested an additional $ 50,000 in § 105 Grant funding to perform this work.[9] EPA chose to fund this project with grant monies appropriated by Congress in Fiscal Years 2000 and 2001, but because project selection occurred very late in FY 2000, the funds were actually awarded in 2001 and 2002. The scope of work under this proposal included 1.) updating the 1998 inventory to reflect 1999 HAP emissions, 2.) development of an on-road mobile source HAP emission inventory based on modeling using detailed local traffic count and vehicle registration data, 3.) expansion of the existing stationary source inventory to include selected categories of area source HAP emissions, 4.) development of public information materials to disseminate information on HAP emissions, and 5.) performance of dispersion modeling of selected area sources to help evaluate exposure risks associated with area sources of HAP emissions.

The mobile source modeling was completed in 2001, and the results of this effort were submitted in a Final Report to Region 4 in August of that year.[10] In October 2001, DNR expanded the format of the City of Huntsville Air Quality Report, thereby completing the public information component of the Air Toxics Characterization Grant.[11]

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[7] EPA is required by § 111 of the Clean Air Act to promulgate New Source Performance Standards for the control of emissions from new sources in selected source categories. The focus of NSPS is primarily the control of criteria pollutant emissions. See 42 USC § 7411.

[8] Reference the Report forwarded to Ms. Linda Anderson-Carnahan of Region 4's Air Planning Branch under cover of Mr. D. Shea's January 12, 2000 transmittal letter.

[9] Reference the Proposal forwarded to Mr. Doug Neeley of Region 4's Air & Radiation Technology Branch under cover of Mr. D. Shea's July 31, 2000 transmittal letter, and Mr. Neeley's response, dated September 6, 2000, indicating DNR's proposed project had been selected for funding.

[10] Reference the "Air Toxics Characterization Status Report", and *Mobile Source Air Toxics Emission Data: 1996 and 1999* (submitted as a separate volume) forwarded to Ms. Kay Prince of Region 4's Air Planning Branch under cover of Mr. D. Shea's August 6, 2001 transmittal letter.

[11] *Air Quality Report: Data Summaries, Trend Analysis, and Program Activities,* City of Huntsville Division of Natural Resources & Environmental Management, Report No. AQR/10-01. This report may be viewed at DNR's web-site: www.ci.huntsville.al.us/NatRes/

A project status report was submitted to Region 4 in August 2001 as well, at the time the Mobile Source inventory report was submitted. The status report included the updated HAP inventory for 1999, but this inventory did not reflect the contemplated expansion to include additional area source categories. Furthermore, at the time of the August 2001 submittal DNR had not yet performed the dispersion modeling as proposed.

In the sections that follow, this Report provides detailed information on the development of HAP emissions information for the selected categories of area sources described in the project proposal for the second phase of development of Huntsville's HAP emission inventory. The results of dispersion modeling reflecting possible population exposure in the vicinity of selected area HAP sources are presented in a separate report. Thus, preparation and submittal of these reports completes the work performed under the FY 2000 and 2001 Air Toxics Characterization § 105 Grant to the City of Huntsville. This Report should be viewed as a companion volume to the August 2001 Report, *Mobile Source Air Toxics Emissions Data: 1996 and 1999.*

C. Scope of Area Source Inventory Development Project

As described in the FY 2000 Air Toxics Characterization Grant Proposal, continued development of the area source HAP emissions inventory would consist of two distinct work efforts. The first of these efforts simply involved updating the existing inventory for 1998 to reflect 1999 emissions. As noted in the preceding section, this work was completed in 2001. The results have already been submitted to EPA Region 4, and are reflected in the most recent edition of Huntsville's Biennial Air Quality Report. Among the types of facilities included in the inventory are:

1.) Gasoline Dispensing Facilities
2.) Gasoline Bulk Plants
3.) Dry Cleaners
4.) Surface Coating Operations
5.) Solvent Cleaning Operations
6.) Chrome Plating
7.) ETO Sterilizers

The second component of area source inventory development involved collection of data from selected area source categories. Specifically, the following types of area sources were included:

1.) Automobile Paint & Body Shops
2.) Cabinet Shops
3.) Wood Furniture Refinishing Shops
4.) Custom Marble Casting Shops
5.) Plastic Product Fabrication Facilities
6.) Print Shops and Publishing Facilities
7.) Architectural Surface Coating Usage

II. METHODS FOR INVENTORY DEVELOPMENT

A. Overview and General Approach

Due to the relatively large number of area sources within the categories selected for evaluation, DNR employed an approach that combined the use of questionnaires with site visits and detailed evaluations of material usage at representative facilities. In other words, detailed information was obtained from several facilities within each category of area source, and this information was supplemented by information provided in completed questionnaires. The questionnaires were customized for specific categories of area sources in an effort to obtain relevant information for each category, and also with an eye toward providing sufficient data to reliably extrapolate the results of the detailed facility HAP emissions evaluations to the overall facility population within the category. For example, once a sufficient number of auto paint and body shops have been evaluated to develop a representative profile of HAP emissions for a single paint job, other metrics such as the number of cars painted may be used to extrapolate the emissions from the profiled facilities to the entire source population. Follow-up telephone contacts were made to encourage submittal of completed questionnaires, and repeated site visits were made as necessary to obtain detailed material usage information from selected facilities.

The most widely used approach to quantify HAP emissions from specific facilities involved material balance techniques. However, in some cases material usage information was coupled with emission factors to estimate facility HAP emissions. A detailed description of the methods employed for each category of area source evaluated is provided in subsequent sections of this report.

B. Background Information

As discussed in the introduction, DNR had already developed a HAP emission inventory that included permitted minor sources and regulated area source categories, such as gasoline dispensing facilities and dry cleaning facilities. This was done under the initial Air Toxics Characterization Grant awarded in 1999. The specific approach to quantifying HAP emissions from each of these categories was therefore already established, and the current project merely involved updating the information for the facilities already included in the inventory. However, with the increasing scope and coverage of the HAP emissions inventory, it became evident that the existing data management system for tracking stationary source criteria pollutant emissions was poorly suited for handling the additional HAP emissions information.

Historically, DNR has used an in-house spreadsheet program, written in Basic programming language, to track criteria pollutant emissions. The program set up files in a rigid spreadsheet format. These files could be easily updated, and routine updates of facility information and emissions data took very little time. The user could move freely to any point in the spreadsheet for the purpose of editing data, and data entry consequently was not very time-consuming. The report generation capabilities of this system were extremely limited, however, and summary reports were only available for

single facilities, or for all facilities and all pollutants. Customized reports summarizing emissions from particular categories of sources or including only particular pollutants could only be produced by writing new sections of programming code. This effort couldn't be justified, and would have to be repeated every time a different application arose. Consequently, a different approach had to be taken to manage the HAP emissions inventory data.

To avoid problems inherent in the Basic program, such as limited pollutant codes, double counting of HAP and criteria pollutant emissions, and limited report capabilities, the initial HAP inventory prepared under the 1999 Air Toxics Characterization Grant utilized an Excel format. In other words, a parallel inventory for HAPs was established that was entirely independent of the Basic criteria pollutant inventory. This served the immediate purpose, but was recognized as only a temporary solution to the more fundamental problem of developing a more flexible data management system that could accommodate HAP data and produce a wide variety of reports. Consequently, a new customized database was developed using Access, and all emissions inventory related information is now housed in this new data management system.

C. Development of Access Emissions Inventory Data Base

Recognizing the limitations in the criteria pollutant emissions inventory data management system then in use, DNR developed a conceptual design for a more comprehensive, and more flexible system. As envisioned, the replacement system would be capable of managing emissions from non-permitted area sources as well as permitted facilities using a range of source codes. In addition, the system would be able to accommodate an essentially unlimited number of pollutant codes. Multiple years of data would be stored within the database to allow retrieval of historic data in electronic format. The capability of generating customized reports, and performing complex searches and compilations was also deemed essential.

From February through April 2001, the Deputy Director of DNR and the Senior Programmer with the City's Information Technology Services Department worked closely on development of a system in MS Access that met the requirements indicated above. This effort was followed by the laborious task of entering the facility information for the entire permitted source population (stack height, longitude, latitude, exhaust flow rate, etc., for each emission point) and the criteria pollutant emission inventory information for 1999. In addition, A User's Manual was developed that describes features of the system, data entry procedures, automated features of the database, standard report generation, customization of database queries, and a troubleshooting section.[12]

Entry of speciated HAP data for the permitted facilities, and creation of facility files for the non-permitted regulated area sources included in the HAP inventory developed under the 1999 Air Toxics Characterization Grant was completed in the latter

[12] Mims, G.; *Facilities Emissions Inventory System: User's Guide;* City of Huntsville Division of Natural Resources & Environmental Management; AQDM/05-01; May 2001.

half of 2001. This expansion of the Access database reflected year 2000 HAP emissions, and was accomplished in conjunction with the update to the existing HAP inventory performed under the FY 2000-2001 Air Toxics Characterization Grant. These data are now updated routinely at the time facility inspections are performed. Thus, the system now houses HAP emissions data for permitted facilities for 1999, 2000 and 2001.

Sample facility emissions reports appear in Appendix A. Included in the Appendix are screen printouts showing the level of detail associated with the Facility Identification screen, the information associated with each emission point, and sample summary reports that are routinely generated and included as a component of the facility inspection reports. One last point about this database is worthy of mention. DNR had long refused (and still refuses) to utilize AIRS AFS as the primary emissions inventory data management system, largely because of the time-intensive nature of routine data entry. The Access database has an automated feature that allows the user to reproduce the emission point data for a facility from the prior year. This superimposed information can then be edited only as necessary to reflect changes at the facility, thereby minimizing redundant data entry. The previous year's data is not overwritten, and may still be retrieved by doing a search based on year of emissions. The database is obviously quite large, and is routinely backed up on the City's mainframe. It is backed-up daily and stored on magnetic tape, so there is never the danger of losing huge amounts of information.

D. Historical Area Source HAP Emissions Inventory Development Efforts

As discussed in the Introduction, DNR developed an initial HAP emissions inventory under the FY 1999 Air Toxics Characterization Grant, which encompassed major sources, permitted minor sources and regulated area sources. The initial HAP inventory reflected 1999 HAP emissions, and was updated to reflect year 2000 HAP emissions under the work plan developed for the FY 2000-2001 Air Toxics Characterization Grant. As noted previously, the updated inventory was provided to EPA as a component of the project submittal made in August 2001 (reference Footnote 10, *supra*).

A list of the major sources, permitted minor sources and regulated area sources with HAP emissions is included as Table I.

E. Methods Employed for Specific Area Source Categories

1. Permitted Minor Sources and Regulated Area Sources

DNR issues Air Permits to minor sources with relatively low levels of actual emissions. Although several factors enter into the decision of whether a facility requires an Air Permit, any facility with criteria pollutant emissions of roughly 10 TPY (Tons Per Year) generally requires a Permit. Facilities with lower emissions are also permitted if they are subject to specific regulatory requirements, such as a New Source Performance

Table I – Major Sources, Permitted Minor Sources and Regulated Area Sources with Hazardous Air Pollutant Emissions. Facilities listed in this Table are those included in the initial 1999 HAP emissions inventory for Huntsville, Alabama.

Major Sources

Facility	*Principal Business*	*Source of HAPs*
General Shale	Brick	Tunnel Kiln
Goodyear Dunlop	Rubber Tire Manufacturing	Tire Manufacturing
Hart & Cooley	HVAC Air Diffusers	Surface Coating
Kohler Company	Plumbing Fixtures	SMC, Molding
Martin Stove	Wood Stoves & Heaters	Surface Coating
Mesker Door	Metal Doors	Surface Coating
National Copper	Copper Tubing	Vapor Degreaser
Palco Telecom	Telecommunications Equip.	Solvent Reflow

Minor Sources

Facility	*Principal Business*	*Source of HAPs*
A.C., Inc.	Military Equipment	Surface Coating
Huntsville Cabinet	Cabinet Shop	Surface Coating
Huntsville Hospital	Hospital	ETO Sterilizer
J & A Enterprises	Plating & Painting	Surface Coating
Perfect Homes	Linen Manufacturing	Spot Cleaning
PPG Industries	Aircraft Windshields	Surface Coating
Ridge Instruments	Military Vehicle Components	Surface Coating
Scientific Utilization	Pyrolysis R & D	Pyrolysis
Summa Technologies	Military/ Aerospace	Chrome Plating/ Surface Coating
Taylor Wharton	Gas Cylinders	Surface Coating
United Plating	Plating & Painting	Surface Coating

Gasoline Bulk Plants

Facility
Byrom Oil
Thrasher Oil
Stevens Oil
J.D. Gibbs Distributing

Table I (cont') – Major Sources, Permitted Minor Sources and Regulated Area Sources with Hazardous Air Pollutant Emissions. Facilities listed in this Table are those included in the initial 1999 HAP emissions inventory for Huntsville, Alabama.

Gasoline Dispensing Facilities

Facility (117 GDFs)	*Facility*
Alamo Rent-a-car	Fuel Express (1 station)
Amoco (7 stations)	Hertz Rent-A-Car
Avis Car Rental	H'ville- Mad. Co. Airport Auth.
Chevron (9 stations)	National Car Rental
Circle C (11 stations)	Shell Foods (12 stations)
Conoco (8 stations)	Texaco (9 stations)
Discount Foods (4 stations)	United Parcel Service
Duke & Long (7 stations)	USA (1 station)
Exxon (2 Stations)	Wavaho (3 stations)
E-Z Serve (4 stations)	Williams Service (3 stations)
Fuel City (3 stations)	Independents (27 stations)

Dry Cleaners

Facility	*Facility*
Advantage Cleaners	Sneeds Cleaners
Carriage Cleaners	University Cleaners
Classic Cleaners	U.S. Cleaners
Five Points Cleaners	West Huntsville Cleaners
Gates Cleaners	Whitesburg Cleaners
Master Cleaners	Wilson Cleaners
Red Hanger Cleaners	Ultra Clean – Mastin lake
Royal Cleaners	Ultra Clean – Patton Rd.
Service Cleaners	

Standard. Also, lower thresholds are applied to facilities that emit HAPs. Finally, a facility with relatively low emissions, but which has the potential for substantial emissions increases over a relatively short period of time, are also issued Permits to ensure that DNR remains apprised of current emission levels.

Major Source Operating Permits require facilities to determine their emissions of regulated pollutants on a regular basis in order to support the calculation of annual emission fee payments. Synthetic Minor Operating Permits also require quantification of emissions to ensure ongoing compliance with an emission cap. In order to maintain a reasonably complete criteria pollutant emissions inventory, DNR also imposes sufficient monitoring on permitted minor sources to allow ongoing tracking of emissions. For this reason, Air Permits include requirements to maintain sufficient records to determine emissions. Thus, permitted facilities that operate paint booths or coating lines are required to track paint and solvent usage. Similarly, facilities that perform solvent cleaning operations are required to track solvent usage. Electronic manufacturing plants are required to track flux and thinner usage. Asphalt plants and quarries are required to keep production records. Thus, although the form of the required records varies depending on the type of operation, all permitted minor sources are required to keep sufficient records to allow determination of emissions, and this information is routinely reviewed and utilized to update the criteria pollutant emissions inventory at the time each facility is inspected. These records also served as the basis of the HAP emissions determinations for these facilities.

a.) Gasoline Dispensing Facilities

Emission estimates for gasoline dispensing facilities (GDFs) were based on actual throughput records at each gasoline dispensing facility. Each GDF is required to maintain fuel throughput records under the provisions of the City of Huntsville Stage 1 Vapor Recovery regulations.[13] The fuel throughput data were then used in conjunction with AP-42 emission factors to determine evaporative VOC emissions.[14] In turn, HAP emissions were calculated using the average vapor weight percent of HAP's as a fraction of the VOC emissions. Information on the weight fractions of HAPs in gasoline vapors were obtained from EPA,[15] and these data were used to speciate the VOC emissions, and thereby quantify the emissions of individual HAPs from each GDF.

b.) Gasoline Bulk Plants

Actual fuel throughput data were obtained from each of the gasoline bulk plants

[13] City of Huntsville Air Pollution Control Rules & Regulations (COHRAR), § 8.8.1, *et seq.*

[14] *Compilation of Air Pollutant Emission Factors*, 5th Ed.; USEPA OAQPS; AP-42; January 1995; § 5.2.

[15] Petroleum Refinery Liquid HAP and Properties Data (See Table 8 – Gasoline Storage Vessel Liquid HAP Concentration Data); 1993; Relevant information from this report was forwarded to J. F. Durham, US EPA/CPB from P. B. Murphy, Radian/RTP, and then provided to DNR.

in Huntsville. Bulk plants are subject to Stage 1 Vapor Recovery regulations,[16] as are gasoline dispensing facilities, and are required to maintain records of fuel throughput. Detailed information on the above ground fuel storage tanks was then used, in conjunction with fuel throughput data and local climatological data, as input into emissions estimation software. The *Tanks 4.0* program, available from EPA, was used to generate both VOC and HAP emission estimates for each facility.[17]

c.) Perchloroethylene Dry Cleaners

Dry cleaning facilities that use perchloroethylene as the cleaning fluid are one of the few area source categories subject to a MACT standard.[18] Included among the records that must be maintained by these dry cleaners is a log of cleaning solvent usage. Routine compliance inspections of these facilities are performed by DNR personnel, and information on perchloroethylene consumption is included in each inspection report. Straightforward material balance calculations yield HAP emissions data.

d.) Surface Coating Operations at Permitted Minor Sources

Surface coating, thinner and clean-up solvent usage records are maintained by permitted facilities. These usage records are coupled with information on material composition, taken from Material Safety Data Sheets (MSDS's), to calculate both VOC emissions and emissions of individual HAPs, using straightforward material balance techniques. The material balance includes VOC-shipped-in-waste calculations for those facilities with sufficient coating or solvent usage to justify the additional effort, provided there is sufficient information on waste composition to allow inclusion of the waste term in the material balance calculations. Thus, for some facilities, the VOC and HAP emissions may be slightly overstated due to the omission of off-site waste disposal from the material balance calculations. However, these tend to be the facilities with relatively low coating and solvent usage, waste generation is correspondingly low, and the overall effect on the accuracy of the HAP inventory is considered to be inconsequential.

e.) Solvent Cleaning Operations at Permitted Minor Sources

The approach used for solvent cleaning operations is essentially identical to that used for surface coating operations and need not be described in detail.

f.) Chrome Plating

There is only one facility in Huntsville that still performs chromium electroplating. This is a captured chromium anodizing shop at a facility that manufactures military and aerospace hardware. Although several of the plating shops

[16] COHRAR, § 8.7.1, *et seq.*

[17] The *Tanks 4.0* software calculates evaporative emissions from bulk storage of volatile organic liquids.

[18] National Perchloroethylene Air Emission Standards for Dry Cleaning Facilities; 40 CFR § 63.320, *et seq.* This NESHAP has been incorporated by reference into the COHRAR. (See Part 14.5, Subpart M).

performed chromium plating in the past, none of the plating job-shops in Huntsville continue to offer decorative chrome plating, hard chrome plating, or chromic acid anodizing services. The facility that performs chromic acid anodizing is subject to an area source MACT standard.[19] This standard requires the facility to keep a log of anodizing tank operating hours. Emissions estimates for chromium emissions are based on actual operating hours, known tank dimensions, and emission factors for chromium anodizing with fume suppressants taken from AP-42.[20]

g.) Ethylene Oxide Sterilizers

Huntsville has no commercial EO sterilizers in operation, but the area hospitals do operate relatively small sterilizers. These facilities hold Air Permits that require tracking of ethylene oxide usage. This information is then used with an emissions factor obtained from EPA to calculate ethylene oxide emissions.[21]

2. Non-Permitted, Non-Regulated Area Sources

a.) Automobile Paint and Body Shops

A questionnaire was developed for paint and body shops, and a copy of the form used is included in Appendix C. Requested information included materials usage information (coatings, solvents, fillers, etc.), the number of cars painted, the number of spray booths in the facility, etc. At the time the survey was conducted there were 43 automotive paint and body shops listed in the Huntsville telephone directory. Questionnaires were provided to 13 of these facilities, and all of these businesses were also selected for site visits. Numerous follow-up contacts were made, either by telephone or through on-site visits in an effort to maximize the response to the written questionnaires. In addition, an Environmental Specialist made a presentation to the Alabama Collision Repair Association in response to the interest (and perhaps apprehension) that visits by Natural Resources inspectors to a number of the member businesses had engendered. Table II summarizes the activities that were conducted by Natural Resources personnel in gathering information from local automotive refinishing operations.

Detailed material balances were performed where sufficient material usage and material composition information was provided to allow completion of a material balance. HAP concentrations in paints and solvents were obtained from MSDS's, and

[19] National Emission Standards for Chromium Emissions From Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks; 40 CFR § 63.340, *et seq.* This NESHAP has been incorporated by reference into the COHRAR. (See Part 14.5, Subpart N).

[20] *Compilation of Air Pollutant Emission Factors*, 5th Ed.; USEPA OAQPS; AP-42; January 1995. See § 12.20 (July 1996 Supplement).

[21] USEPA; *Toxic Air Pollutant Emission Factors for Selected Air Toxic Compounds and Sources*; EPA-450-2-88-006a; OAQPS; October 1988.

Table II – HAP Emissions Inventory Automotive Refinishers (Paint & Body Shops) Survey Activities

Facility Name	Site Visit?	Survey Provided?	Survey Completed?	Follow Up? No.?	Results
Auto Collision Body Shop	Yes	Yes	Partial	Yes (2)	See HAP Inv. Mat'l Usage
Corlett Auto Restoration	Yes	Yes	Partial	Yes (3)	See HAP Inv. Mat'l Usage
MAACO Auto Painting	Yes	Yes	Yes	Yes (4)	See HAP Inv. Mat'l Usage
Peach Auto Painting	Yes	Yes	Partial	Yes (6)	See HAP Inv. Mat'l Usage
Rod's Custom Body Shop	Yes	Yes	Yes	Yes (3)	See HAP Inv. Mat'l Usage
Sledge Custom Body Shop	Yes	Yes	Partial	Yes (4)	See HAP Inv. Mat'l Usage
Woody Anderson Ford	Yes	Yes	Partial	Yes (4)	See HAP Inv. Mat'l Usage
Bentley Automotive	Yes	Yes	No	Yes (4)	Information Inadequate
Bill Heard Chevrolet	Yes	Yes	Partial	Yes (6)	Information Inadequate
L & L Garage	Yes	Yes	No	No	Information Inadequate
C & J Auto Repair	Yes	Yes	No	Yes (4)	Information Inadequate
Auto Collision Specialists	Yes	Yes	No	Yes (2)	Information Inadequate
Danny B's Detail Paint & Body	Yes	Yes	No	Yes (2)	Information Inadequate

this information was coupled with coating-specific and solvent-specific usage rates to calculate HAP emissions. This information was then extrapolated to the entire universe of automotive refinishing facilities by subjectively categorizing the source population into two subgroups, and extrapolating the average emissions for the "small shops" and "large shops and dealerships" across their respective classes.

b.) Cabinet Shops

The basic approach taken with respect to cabinet shops was similar to that employed for the automobile refinishers. A copy of the questionnaire developed for cabinet shops is also included in Appendix C. Requested information included materials usage information (coatings and solvents), production information, the number of spray booths in the facility, etc. At the time the survey was conducted there were 13 cabinet shops listed in the Huntsville telephone directory. Questionnaires were provided to 4 of these facilities. (A fifth facility has been issued a Permit by DNR and keeps detailed information on a routine basis). Each of the businesses provided with a questionnaire was also inspected. Numerous follow-up contacts were made, either by telephone or through on-site visits in an effort to maximize the response to the written questionnaires. Table III summarizes the activities that were conducted by Natural Resources personnel in gathering information from local cabinet shops and custom furniture manufacturers.

Detailed material balances were performed where sufficient material usage and material composition information was provided to allow completion of a material balance. HAP concentrations in paints and solvents were obtained from MSDS's, and this information was coupled with coating-specific and solvent-specific usage rates to calculate HAP emissions. This information was then extrapolated to the entire universe of wood furniture manufacturing area source operations by simply averaging the emissions from the facilities for which detailed data were available and extending those averages across the entire population of sources.

c.) Wood Furniture Refinishers

Again, the approach taken for wood furniture refinishers was very similar to that employed for the area source categories already discussed. A copy of the questionnaire developed for wood furniture refinishing businesses is also included in Appendix C. Requested information included materials usage information (coatings and solvents) and production information. At the time the survey was conducted there were 9 wood furniture refinishers listed in the Huntsville telephone directory. Questionnaires were provided to 3 of these facilities, and each of these businesses was inspected. Numerous follow-up contacts were made, either by telephone or through on-site visits in an effort to maximize the response to the written questionnaires. Table IV summarizes the activities that were conducted by Natural Resources personnel in gathering information from local wood furniture refinishing operations.

Detailed material balances were performed where sufficient material usage and material composition information was provided to allow completion of a material

Table III - HAP Emissions Inventory Cabinet Shop Survey Activities

Facility Name	Site Visit?	Survey Provided?	Survey Completed?	Follow-Up?	Results
Carlin Cabinets	Yes	Yes	Partial	Yes (4)	See HAP Inv. Mat'l Usage
Custom Cabinets	Yes	Yes	Partial	Yes (2)	See HAP Inv. Mat'l Usage
H'ville American Cabinets	Yes	No	N/A	N/A	See HAP Inv. Mat'l Usage
Price Cabinet Shop	Yes	Yes	Partial	Yes (3)	See HAP Inv. Mat'l Usage
If It's Wood	Yes	Yes	Partial	Yes	Information Inadequate

Table IV - HAP Emissions Inventory Wood Furniture Refinishers Survey Activities

Facility Name	Site Visit?	Survey Provided?	Survey Completed?	Follow-Up?	Results
Art Craft Upholstery	Yes	Yes	Yes	Yes (2)	See HAP Inv. Mat'l Usage
Woodpride Refinishing	Yes	Yes	Partial	Yes (2)	See HAP Inv. Mat'l Usage
The Final Finish	Yes	Yes	No	Yes (4)	Information Inadequate

balance. HAP concentrations in paints and solvents were obtained from MSDS's, and this information was coupled with coating-specific and solvent-specific usage rates to calculate HAP emissions. This information was then extrapolated to the entire universe of wood furniture refinishing operations by simply averaging the emissions from the facilities for which detailed data were available and extending those averages across the entire population of sources.

d.) Custom Marble Casting Shops

There were only 4 manufactured marble facilities listed in the Huntsville telephone directory, 3 of which were located within the City limits at the time of the survey. (Since that time one of the three remaining facilities has relocated to the County). Due to the small number of these facilities, a somewhat different approach was taken. Although a questionnaire was developed, a copy of which is included in Appendix C, the purpose of the questionnaire was simply to provide a convenient format for the inspector to record information. Each of the marble casting facilities was inspected and the questionnaires were completed by DNR inspectors based on information obtained in on-site interviews. Relevant information included resin and gel-coat usage, production information, and the number of spray booths used for gel-coat application. Table V summarizes the activities that were conducted by Natural Resources personnel in gathering information from local marble casting facilities.

Composition information from the gel-coat MSDS, gel-coat usage information and emission factors were used to calculate styrene emissions from the gel-coat application process. Emission factors were taken from the Unified Emissions Factor for Open Molding, developed by the Composite Fabricators Association.[22] For the casting operation, resin styrene content was used in conjunction with an emission factor recommended by the Composites Fabricators Association to estimate HAP emission.[23] Note that this factor is based on the old AP-42 factor for marble casting. Because the emission factors published in AP-42 significantly underestimated emissions from open molding operations, and the Unified Emissions factors are now recommended, the section of AP-42 addressing polyester resin plastic products fabrication has been removed. However, the factor for marble casting was never repudiated.[24]

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[22] *Unified Emission Factors for Open Molding of Compositess,* Composite Fabricators Association, July 2001. See also Haberlein, R.A.; *Annotated CFA Emission Models for the Reinforced Plastics Industries;* Engineering Environmental Consulting Services for the Composites Fabricators Association; April 1999. Also see Haberlein, R.A.; *Technical Discussion of the Unified Emissions Factors for Open Molding of Composites*; Engineering Environmental Consulting Services for the Composites Fabricators Association; April 1999.

[23] Craigie, L.; "CFA Guidance on Use of Emission Factors for Polymer Casting," August 2001.

[24] *Compilation of Air Pollutant Emission Factors,* 5th Ed.; USEPA OAQPS; AP-42; January 1995. See the former § 4.4. Also see March 18, 1998 Notice from Ron Ryan, USEPA, regarding withdrawal of AP-42 § 4.4.

e.) Plastic Products Manufacturing Facilities

A number of facilities in Huntsville manufacture plastic products. In addition to using the Huntsville telephone directory, the Chamber of Commerce Biennial Directory was used to identify plastic product manufacturers.[25] Several of these facilities are fairly large operations that employ a significant number of people, and the Chamber Directory served as a useful tool in screening facilities for detailed evaluation. Using these sources of information, a total of 15 plastic products manufacturing facilities were identified. Of these 7 were inspected, and six of the facilities selected for inspection provided detailed information to Natural Resources personnel. Table VI summarizes the activities conducted by Natural Resources personnel in evaluating this area source category.

Several possible sources of VOC and HAP emissions exist in the manufacture of plastic products. These include use of adhesives and cleaning solvents, emissions from plasticizers used in plastic extrusion, and emissions resulting from the use of blowing agents in plastic foam products. For adhesives and cleaning solvents, information on material composition was taken from MSDS's, and this was coupled with material usage information to perform a straightforward material balance. For emissions of plasticizers during extrusion, and for emissions resulting from the use of blowing agents in foam products, emission factors provided by STAPPA/ALAPCO and by the blowing agent manufacturer were coupled with material usage and composition data to estimate emissions from these processes.[26] A document prepared under the Emission Inventory Improvement Program (EIIP) was also consulted to assist in determining emissions from the plastic product manufacturing facilities.[27]

f.) Print Shops and Publishing Facilities

Although there are no large printing or publishing facilities in Huntsville, there are a large number of small print shops and a number of relatively small publishing operations. At the time the survey was conducted there were 14 publishers and 42

[25] *Industrial Directory: 2001-2002; 20th Edition;* Huntsville/Madison County Chamber of Commerce; 2001.

[26] *Air Quality Permits: A Handbook for Regulators and Industry – Volume I;* STAPPA/ALAPCO; 1991. See Section 6: "Plastic Extrusion."

[27] *Preferred and Alternative Methods for Estimating Air Emissions from Plastic Products Manufacturing: (Point Sources: Volume II, Chapter 11);* Eastern Research Group, Inc. prepared for Point Sources Committee, Emission Inventory Improvement Program; December 1998.

Table V - HAP Emissions Inventory Custom Marble Casting Shop Survey Activities

Facility Name	Site Visit?	Survey Provided?	Survey Completed?	Follow-Up?	Results
Artisitc Tile and Marble	Yes	Yes	Yes	Yes (2)	See HAP Inv. Mat'l Usage
Hall Marble and Tile	Yes	Yes	Yes	Yes (4)	See HAP Inv. Mat'l Usage
Southeastern Tile and Marble	Yes	No	Partial	Yes	See HAP Inv. Mat'l Usage

printers listed in the Huntsville telephone directory. Questionnaires were provided to 20 of these facilities, and a subset of these businesses was selected for site visits. Table VII summarizes the activities performed by Natural Resources personnel in gathering information for this area source category.

Emissions from printing and publishing operations primarily result from solvents contained in the inks and solutions used for cleaning the printing equipment. Material composition data, i.e. VOC and HAP content, was taken from MSDS's and used in conjunction with materials usage information to determine total speciated HAP emissions through material balance.

F. Methods Employed for Architectural Surface Coating Distribution

In an effort to characterize HAP emissions from the use of architectural and automotive coatings, DNR conducted a survey of paint distributors in the area. Rather than requesting usage information, as with the other source categories, the information of interest with regard to paint distribution relates to sales volume and the type of products sold. There is a wide variety of paint products, and individual MSDS's are typically not prepared for each individual coating. Rather, MSDS's are designed to cover a particular "family" of coatings, and reflect the range of concentrations of particular constituents that characterizes that group of coatings. This makes the seemingly impossible task of characterizing HAP emissions from use of automotive and architectural coatings more manageable. It also simplifies the task of associating MSDS data with summaries of sales information. By grouping coating sales with representative MSDS data, a material balance can be performed to determine HAP emissions from the use of architectural and automotive coatings in the area.

A survey form was not used to gather information from area paint distributors. Rather, site visits and telephone contacts were employed in an effort to obtain sales data, by product type, and coating composition data. Table VIII summarizes the activities by DNR personnel in conducting the HAP emission inventory survey of paint distributors in the Huntsville area.

Table VI - HAP Emissions Inventory Plastic Product Manufacturing Facility Survey Activities

Facility Name	Site Visit?	Survey Provided?	Survey Completed?	Follow-Up?	Results
Kommerling, USA	Yes	Yes	Yes	Yes (3)	See HAP Inv. Prod. Throughput
Thompson Plastics	Yes	Yes	Yes	Yes (3)	See HAP Inv. Mat'l Usage
TYCO Fire Products CPVC	Yes	Yes	Yes	Yes (3)	See HAP Inv. Mat'l Usage
Plastic Fusion Fabricators	Yes	No	No	No	Fabrication Only
ISCO Industries	Yes	No	No	No	Fabrication Only
AFC Plastics	Yes	No	No	No	Fabrication Only
Available Plastics	Yes	Yes	Partial	Yes (2)	Information Inadequate

Table VII - HAP Emissions Inventory Printers & Publishers Survey Activities

Facility Name	Site Visit?	Survey Provided?	Survey Completed?	Follow-Up?	Results
All American Printing	Yes	Yes	Yes	Yes (1)	See HAP Inv.
COH Print Shop	Yes	Yes	Yes	Yes (1)	See HAP Inv.
Colonial Graphics	Yes	Yes	Yes	Yes (1)	See HAP Inv.
Frost Printing	Yes	Yes	Yes	Yes (1)	See HAP Inv.
Graphic Color	Yes	Yes	Partial	Yes (1)	See HAP Inv.
Holmes Printing & Graphics	Yes	Yes	Yes	Yes (1)	See HAP Inv.
Huntsville Times	Yes	Yes	Yes	Yes (1)	See HAP Inv.
Insty-Prints	Yes	Yes	Yes	Yes (1)	See HAP Inv.
Off-the-Wall Screen Printing	Yes	Yes	Yes	Yes (1)	See HAP Inv.

Table VII - HAP Emissions Inventory Printers & Publishers Survey Activities (Continued)

Facility Name	Site Visit?	Survey Provided?	Survey Completed?	Follow-Up?	Results
Print Shack Printing	Yes	Yes	Yes	Yes (1)	See HAP Inv.
Quality Quick Printing	Yes	Yes	Yes	Yes (1)	See HAP Inv.
Superior Printing	Yes	Yes	Partial	Yes (1)	See HAP Inv.
White Tiger Graphics	Yes	Yes	Yes	Yes (1)	See HAP Inv.
XCEL Printing	Yes	Yes	Yes	Yes (1)	See HAP Inv.
HG Peake Co.	Yes	Yes	No	Yes (2)	Inadequate Info
Ink Dogs	Yes	Yes	No	Yes (2)	Inadequate Info
PS Printing	Yes	Yes	No	Yes (2)	Inadequate Info
Printing Sol’ns	Yes	Yes	No	Yes (2)	Inadequate Info
Tangent Print	Yes	Yes	No	Yes (2)	Inadequate Info
Tenn.Valley Pr.	Yes	Yes	No	Yes (2)	Inadequate Info

Table VIII - HAP Emissions Inventory Paint Distributors Survey Activities

Facility Name	Coating Type	Follow-Up?	Results
Automotive Refinish Tech.	Automotive	Yes (3)	Internet Sales
Reid Auto Color & Equip.	Automotive	Yes (6)	Inadequate Info.
Keystone Automotive	Automotive	Yes (3)	Sales Data Provided
Moore Auto Paint, Inc.	Automotive	Yes (4)	Limited Info. Provided
ICI Deluxe	Architectural	Yes (3)	Referred to Corporate
Sherwin Williams P. & I.	Architectural	Yes (1)	No Useful Info.
Lowe's	Architectural	No	No Useful Info.
Home Depot	Architectural	Yes	No Useful Info.
Sherwin Williams	Architectural	Yes	Est. Annual Sales Info.
Huntsville Decorating	Architectural	Yes	No Useful Info.
BLP Mobile Paints	Architectural	Yes (5)	No Useful Info.
KM Paint Co.	Architectural	No	No Sales (Contractor)
The Paint Place (PPG)	Architectural	Yes (1)	No Useful Info.

III. RESULTS OF HAP EMISSIONS INVENTORY DEVELOPMENT

A. Permitted Sources and Regulated Area Sources

As discussed in the Introduction, Huntsville initially developed a HAP emissions inventory that reflected 1998 HAP emissions. The inventory was somewhat limited in scope, including only HAP emissions from Major Sources, permitted minor sources and non-permitted, regulated area sources (notably perchloroethylene dry cleaning facilities subject to NESHAP requirements). A component of the 2000-2001 Air Toxics Characterization Grant Work Plan required updating the 1998 inventory to 1999. This work was completed relatively early in the project period, and the results were forwarded to EPA Region 4 in August 2001 (reference Footnote 8, *supra*). In completion of a relatively minor component of the 2002-2003 Air Toxics Characterization Grant Work Plan, DNR has again updated this inventory. Year 2001 HAP emissions are currently reflected in the HAP inventory, and these data are summarized in Table IX. The methods employed in development of this inventory are described in detail in Section II.E of this Report. Summary reports by source category, taken from the Access Facility Emissions Inventory Database, as well as additional supporting documentation, are compiled in a separate volume.[28]

B. Non-Permitted, Non-Regulated Area Sources

1. Automobile Paint & Body Shops

As shown in Table II of the Methods section, which summarizes the DNR HAP survey activities associated with paint and body shops, questionnaires were provided to 13 automobile refinishing facilities. With some persistence, DNR inspectors were able to obtain complete materials usage information from 7 of the 13 sources surveyed. As noted in the Methods section, there were 43 automobile refinishers listed in the Huntsville telephone directory at the time the survey was conducted. Thus, 30 % of the source population in this category was provided with surveys, and 54 % of those surveyed (16 % of the total population) provided sufficient information to allow performance of a material balance to determine HAP emissions. Detailed material balance calculations were performed for each of these seven facilities, and these calculations appear in spreadsheet format in Appendix D. The results of these material balances are summarized in Table X.

An examination of the data in Table X shows that the principal HAPs are toluene, xylene, MEK, and MIBK. Also, in examining total VOC emissions from these seven facilities (see Appendix D), four of the seven shops have total VOC emissions less than 1.0 TPY, and the remaining three have emissions greater than 2.0 TPY. The first group consists of relatively small shops, and the larger emitting group consists of the two

[28] *Year 2001 HAP Emissions Inventory Summary Reports & Supporting Documentation;* City of Huntsville Division of Natural Resources; AQEI/ 02-03; February 2003.

largest "stand-alone" body shops in Huntsville (Peach and Maaco), and an auto dealership. This observation suggested a relatively simple method for extrapolating the results of the survey to the entire source population within this area source category. Extend the average emissions for the small facilities to the universe of small body shops in the City, and extend the average emissions for the large facilities to the universe of large body shops and dealer-operated body shops. Each establishment was subjectively categorized as either a "small shop" or a "large shop or dealership." This classification indicates that 36 of the 43 paint and body shops in Huntsville are "small shops," and 7 are "large shops or dealerships." The calculations extending the survey results to the entire source population of paint and body shops appear in spreadsheet format in Appendix D. The extended HAP emission totals are included in Table X.

2. Cabinet Shops

Table III of the Methods section provides a summary of the survey activities conducted with respect to cabinet shops, i.e. wood furniture manufacturing operations, in Huntsville. As shown, 5 facilities were surveyed, and detailed information was obtained from 4 of these facilities. However, one of these facilities has been issued an Air Permit by DNR and is now viewed as a minor point source rather than an area source, and is included in the updated minor source inventory. Consequently, emissions from this facility are excluded from the area source inventory totals. As noted in the Methods section, there were 13 wood furniture manufacturing establishments listed in the Huntsville telephone directory at the time the survey was conducted, including the source that has been permitted. Of the 12 area sources, 4 were surveyed (33 % of the population), and complete information was obtained from 3 of these four (25 % of the total source population). The detailed material balance calculations for these facilities appear in spreadsheet format in Appendix D, and are summarized in Table XI. The HAP emissions from these facilities were then extrapolated to the entire source population by simply multiplying the totals by four, i.e. 12 total sources ÷ 3 sources for which detailed information was available. These extended totals are also shown in Table XI.

3. Wood Furniture Refinishers

DNR survey activities with respect to wood furniture refinishing facilities are summarized in Table IV of the Methods section. 3 facilities were surveyed, and with some persistence, detailed material usage information was obtained from 2 of these establishments. The detailed materials balance calculations conducted on these facilities appear in spreadsheet format in Appendix D, and are summarized in Table XII. At the time the survey was conducted, there were 9 wood furniture refinishers listed in the Huntsville telephone directory. Thus, 33 % of the source population was surveyed and HAP emissions for 2 of these three facilities (22 % of the total source population) were determined by material balance. The results of the material balance calculations were then simply multiplied by 4.5 to extrapolate the results to the entire source population within this area source category. (9 total sources ÷ 2 sources for which detailed information was available). These extended totals are also shown in Table XII.

Table IX – 2001 HAP Emissions Inventory for Permitted Sources and Regulated Area Sources

Pollutant	**Gasoline Stations**	**Bulk Plants**	**Dry Cleaners**	**Synthetic Minors**	**True Minors**	**Majors**
Benzene	4.53	0.03				0.8
Dibutyl Pthalate					0.09	
Ethylbenzene	0.5	0.02			0.13	
Ethylene Glycol				0.51		
Ethylene Oxide					0.11	
Formaldehyde					0.62	
Dissocyanates					1.04	
Hexane	7.97	0.08				13.52
HF						44.85
Methanol				2.31	0.47	0.1
Chloromethane				1.59		
MEK				3.54	7.54	4.28
MIBK					2.79	9.38
Methylene Chloride				2.04	0.99	
Napthalene					1.3	
Styrene						89.5
Perchloroethylene			22.16			
Toluene	6.4	0.29		0.34	6.25	3.25
Trichloroethylene					0.27	21.6
Trimethylpentane	4.03	0.05				
Xylenes	2.52	0.01			8.64	10.53
Glycol Ethers				0.30		33.83
TOTAL	***26.2***	***0.48***	***22.16***	***10.63***	***30.25***	***231.64***

Table X – 2001 HAP Emissions Inventory for Auto Paint & Body Shop Area Sources

Pollutant	Small Shops (4)	Large Shops(3)	Total (TPY)	Extended Total (TPY)
Toluene	0.45	1.88	2.33	8.45
Xylene	0.55	0.77	1.32	6.76
Ethylbenzene	0.10	0.21	0.31	1.36
MIBK	0.32	0.35	0.67	3.66
MEK	0.25	0.50	0.75	3.45
Diisocyanates	<0.01	0.01	0.01	0.04
Glycol Ethers	0.03	0.03	0.06	0.35
Methanol	0.05	-0-	0.05	0.43
VOC	3.27	10.16	13.43	53.12

Table XI – 2001 HAP Emissions Inventory for Cabinet Shop Area Sources

Pollutant	Surveyed Shops (3)	Extended Totals (TPY)
Toluene	3.03	12.11
Xylene	0.97	3.88
Ethylbenzene	0.24	0.96
MIBK	0.41	1.65
MEK	0.07	0.30
Dioctyl Pthalate	0.35	1.41
Bibutyl Pthalate	0.03	0.13
Methylene Chloride	0.07	0.29
Volatile Organic Compounds	8.40	33.62

Table XII – 2001 HAP Emissions Inventory for Wood Furniture Refinishing Area Sources

Pollutant	Survey Totals (2)	Extended Totals (TPY)
Methanol	1.45	6.50
MEK	0.20	0.91
Toluene	0.37	1.66
Methylene Chloride	3.29	14.82
Dibutyl Pthalate	0.02	0.10
Volatile Organic Compounds	8.03	36.15

4. Custom Marble Casting Shops

As discussed in the Methods section, all three of the marble casting facilities in Huntsville provided detailed material usage information, allowing calculation of emissions using material balance and emission factors. The survey activities conducted for this source category are summarized in Table V of the Methods section. The detailed calculations appear in spreadsheet format in Appendix D, and the HAP emissions are summarized in Table XIII, below. There was no need to extrapolate the results of the emissions determinations since all of the area sources in this category were included in the survey, and all responded with sufficient information to allow HAP emissions calculation.

Table XIII – 2001 HAP Emissions Inventory for Marble Casting Facilities (3 Sources)

Pollutant	Total Emissions (TPY)
Styrene	3.53

5. Plastic Products Manufacturers

DNR inventory development survey activities involving plastic product manufacturers are summarized in Table VI of the Methods section. As noted in the Methods section, there are 15 plastic product manufacturers in Huntsville, and 7 of the 15 facilities were inspected as part of the HAP area source emissions inventory development project. Of the 7 facilities inspected and surveyed, 3 had negligible emissions, 3 provided detailed material usage information, and the information obtained from the seventh source was insufficient to perform a reliable material balance. The detailed HAP emission calculations for this area source category are included in Appendix D, in spreadsheet format, and the results are summarized in Table XIV.

This area source category is more diverse than the other categories examined, and extrapolation of the results is therefore problematic. Of the facilities inspected, several performed only plastic extrusion operations and did not use plasticizers. Consequently, their emissions are negligible. Another facility produces a plastic foam product and criteria pollutant emissions result from the use of the blowing agent. Others perform plastic product assembly, and HAP emissions result from the use of cleaning solvents and adhesives. Due to the diverse nature of these operations, extension of the results of the survey to the entire source population in this area source category is particularly subject to error. Nonetheless, it is better to perform an extrapolation than to look at these results in isolation, so the results were extrapolated. Of the 15 plastic products manufacturers in Huntsville, 7 were surveyed (47 % of the total), and sufficient information was obtained to determine emissions from 6 of these facilities (40 % of the total source population). As noted above, emissions from three of these facilities were negligible. The extended totals for this source category were obtained by multiplying the total emissions from the 6

totals for this source category were obtained by multiplying the total emissions from the 6 facilities by 2.5 (15 total facilities ÷ 6 facilities for which sufficient information was obtained to determine emissions). These extended results should be viewed with caution, and appear in Table XIV.

Table XIV – 2001 HAP Emissions Inventory for Plastic Products Manufacturers

Pollutant	Total HAPs (6 facilities)	Extended Totals (TPY)
MEK	2.20	5.50
TCE	0.61	1.53
Isophorone	0.19	0.48

6. Printers and Publishers

Table VII of the Methods section summarizes the DNR survey activities conducted with respect to the printing and publishing area source categories. At the time the survey was conducted there were 56 printing and publishing companies listed in the Huntsville telephone directory. Surveys were provided to 20 of these facilities (36 % of the area source population), and each of these facilities was also inspected. Detailed material usage information was obtained from 14 of these establishments (70 % of those provided with surveys, and 25 % of the total source population in this area source category). The emissions calculations for these operations are included as a spreadsheet in Appendix D. The results are summarized in Table XV. Extended HAP emissions estimates for this source category were then obtained by multiplying the speciated HAP emission totals by 4 (56 facilities in the area source category ÷ 14 facilities for which detailed information was available). The extended totals are also included in Table XV.

C. Architectural Surface Coating Usage

Table VIII in the Methods section summarizes the activities conducted by DNR in an effort to obtain information on surface coating sales and composition information. As shown in Table VIII, these efforts were for the most part unsuccessful, with only two facilities providing information of any possible use. Some facilities said the requested information could not be provided without exhaustive effort. Others claimed confidentiality of sensitive sales information. Others referred the DNR inspectors to a corporate office, which proved to be unresponsive. Due to the poor response, nothing approaching a representative sampling was obtained, and the effort to characterize HAP emissions from architectural coating usage was abandoned in frustration.

Table XV – 2001 HAP Emissions Inventory for Printing & Publishing Area Sources

Pollutant	Total HAPs (TPY) (14 facilities)	Extended Totals (TPY)
Toluene	0.07	0.30
Xylene	0.33	1.32
Ethylbenzene	0.07	0.28
Tetrachloroethylene	0.07	0.29
Ethylene Glycol	0.27	1.09
Hydroquinone	<0.01	0.01
Cumene	0.14	0.55
Methanol	<0.01	0.01
MIBK	<0.01	0.01
Methylene Chloride	0.01	0.04
Total VOC	12.16	48.64

IV. SUMMARY HAP INVENTORY DEVELOPMENT

A. Unregulated Area Source HAP Emission Inventory

Detailed materials balance calculations for each area source that provided material usage information are included in Appendix D in spreadsheet format. Appendix D also includes summary spreadsheets for each area source category, and calculations that extrapolate the results of the emissions inventory development effort to the entire source population within each source category. Tables X through XV in the Results section of this document provide an overview of these data. The extrapolated totals for all of these unregulated area source categories are consolidated into Table XVII.

B. Consolidated 2001 HAP Emissions Inventory

Table XVII consolidates the HAP emissions inventory information developed for the unregulated area sources, as presented in Table XVI, with the information developed for major sources, synthetic minor sources, permitted true minor sources, regulated area sources and mobile sources. Although the inventory is not exhaustive, i.e. it does not include every category of area source (e.g. architectural coating usage, consumer products, etc.), it is by far the most comprehensive HAP emissions inventory that Huntsville has ever had.

Table XVI – HAP Area Source Emission Inventory for Selected Source Categories

HAP	Auto Refinishers	Cabinet Shops	Wood Refinishers	Marble Casting	Plastic Products	Printing & Publishing
Cumene						0.55
Diisocyanates	0.04					
EthylBenzene	1.36	0.96				0.28
Glycol Ethers	0.35					1.09
Hydroquinone						0.01
Isophorone					0.48	
Methanol	0.43		6.5			0.01
MEK	3.45	0.30	0.91		5.50	
Me-Cl		0.29	14.82			0.04
MIBK	3.66	1.65				0.01
Perchloroethyl.						0.29
Pthalates		1.54	0.10			
Styrene				3.53		
TCE					1.53	
Toluene	8.45	12.11	1.66			0.30
Xylene	6.76	3.88				1.32

Table XVII – Consolidated 2001 HAP Emissions Inventory

HAP	Mobile	Major	Syn.Min.	Minor	Reg.Area	Unreg. Area	TOTALS
Acetald.	12.7						12.7
Benzene	117.1				4.56		121.66
Butadiene	16.4						16.4
Cumene						0.55	0.55
Dies.part.	36.9						36.9
Diisocyan.				1.04		0.04	1.08
E-Benzene				0.13	0.52	2.60	3.25
Eth.Glyc.			0.51			1.09	1.6
Eth.Oxide				0.11			0.11
Formald.	36.0			0.62			36.62
Glyc.Ether		33.83	0.3				34.48
Hexane		13.52			8.05		21.57
Hyd.Fluor.		44.85					44.85
Isophorone							0.48
Methanol		0.1	2.31	0.47		6.94	9.82
Chlorome.			1.59				1.59
MEK		4.28	3.54	7.54		10.16	25.52
MIBK		9.38		2.79		5.32	17.49
Me-Cl			2.04	0.99		15.15	18.18
Napthalen				1.3			1.3
Perc.					22.16	0.29	22.45
POM					0.25		0.25
Pthalates				0.09		1.64	1.73
Styrene		89.5				3.53	93.03
Toluene		3.25	0.34	6.25	6.69	22.52	39.05
TCE		21.6		0.27		1.53	23.4
TMP					4.08		4.08
Xylenes		10.53		8.64	2.53	11.96	33.66
TOTALS	***219.1***	***231.64***	***10.63***	***30.24***	***48.84***	***84.16***	***624.61***

V. CONCLUSIONS AND FUTURE AIR TOXICS CHARACTERIZATION PROJECTS

A. Conclusions from HAP Emissions Inventory Project

Perhaps the most salient conclusion to be drawn from the work done to develop an area source HAP emissions inventory for Huntsville is that it requires persistence and perseverance to obtain information from small businesses. The use of questionnaires was originally viewed as a means of saving time, and it was hoped that their use would yield some useful information with little expenditure of staff time. In fact, with few exceptions it required repeated contacts and site visits to obtain the requested information, even for those facilities that seemed genuinely willing to assist in the project. Although the effort to assemble the materials usage information from the selected area source categories was expected to be a time-consuming process from the outset of the project, the actual time required to complete this task exceeded these expectations.

From the outset, it was anticipated that complete information on the types and quantities of materials used by individual facilities would be obtained from only a sampling of the establishments within each area source category. However, it was originally hoped that sufficient information about levels of activity (e.g. number of cars painted by individual automotive refinishers, estimated number of work pieces by wood furniture refinishers, etc.) would be obtained from virtually all of the surveyed facilities, and this would allow an objective and reliable means of extrapolating the detailed data to the source population as a whole. In fact, obtaining this type of information also proved to require a certain tenacity. Somewhat surprisingly, a number of the facilities appeared to be genuinely incapable of providing information either on the quantities of materials used or the general level of business activity. Less surprisingly, those establishments that were able to produce detailed materials usage information were also far more likely to have information available on levels of activity.

Despite the challenges in gathering information and in extrapolating the emissions data for selected sources to the entire source population within a particular area source category, the end result of these efforts is not dissatisfying. Rather, within some of the selected area source categories, detailed information was obtained from a sufficient number of facilities to provide some measure of confidence in the emissions data included in the expanded HAP area source inventory. This is true of the automobile refinishers (7 facilities provided detailed data out of a source population of 43), the custom marble casting shops (3 out of 3), the cabinet shops (3 out of 12) and the printers and publishers (14 out of 56). There is less confidence in the extrapolations for the wood furniture refinishers, where only 2 facilities provided detailed information out of a source population of 9. Even though 7 of the 15 plastic product fabrication facilities in Huntsville provided detailed information, the validity of the extrapolation is somewhat questionable because of the variability in the nature of the operations conducted at these facilities.

Admittedly, the conclusion that the extrapolated emissions inventory totals present a reasonably accurate estimate of the total emissions from these area source

categories in Huntsville relies on a certain amount of subjective evaluation. During the course of the data-gathering phase of the project, DNR inspectors visited a significantly greater number of businesses than the number that ultimately provided sufficiently detailed and reliable information to allow performance of a material balance and thereby determine HAP emissions. In so doing, they gained a "feel" for the relative emissions potential at these facilities based on the size of the shop, physical and equipment limitations, the number of employees, and general observations about their level of business activity. Thus, the overall sense that the population of sources for which detailed inventories were prepared provides a reasonable representation of the source population rests in part on the judgment and experience of the DNR inspectors.

There is one caveat here. Without question, accurate information is more easily obtained from the larger facilities. They tend to keep better records, and they utilize a greater division of labor. There is more at stake in terms of inventory control and no doubt a greater cognizance of the importance of record keeping to minimizing potential tax liability. In short, with increased sophistication of a business, there is a tendency to keep better records. This could be relevant to any extrapolation of inventory results from a sampled population within an area source category because the results may be skewed toward the larger sources. The very smallest sources tend to be underrepresented in the detailed inventory unless countervailing efforts are made to prevent this result. DNR attempted to do this. Information was forthcoming from the largest sources within each source category with relatively little effort. Persistence was then used to help ensure that those smaller facilities that were capable of producing sufficient information to conduct the material balance actually did so. In other words, there was a conscious effort to obtain information from sources across the range of size and sophistication to the maximum extent practicable, in the hope of obtaining a representative baseline.

B. Quality Assurance Checks of Existing HAP Area Source Inventory

Wherever possible, DNR has used national emissions estimates for area source categories as a check on the results of Huntsville's area source emissions inventory development. Data were identified for two of the area source categories included within the scope of the project. These are auto body refinishers, and graphic arts (printing and publishing).

1. Auto Body Refinishing

The Emissions Inventory Improvement Program (EIIP) has developed a Draft document addressing area source emissions from auto body refinishing,[29] which includes several methods of estimating VOC emissions from this area source category. One such method utilizes population as a surrogate parameter and a nation-wide emission rate for the source category of 79,429.4 TPY. Proportional allocation of emissions to Huntsville

[29] *Auto Body Refinishing; Volume III, Chapter 13: External Review Draft*; Eastern Research Group, prepared for EIIP Area Source Committee; January 2000.

is then simply taken as the ratio of Huntsville's population to the national population, multiplied by the national emission rate.[30]

$$(158{,}216 \div 281{,}421{,}906)\ (79{,}421.4 \text{ TPY}) = 44.7 \text{ TPY}$$

This compares with the emissions estimate developed by DNR of 53.1 TPY, as shown in Table X. Thus, the agreement between the two methods is remarkably good, as shown below:

$$(53.1 \text{ TPY} - 44.7 \text{ TPY}) \div (53.1 \text{ TPY})\ (100) = 15.8\ \%\ \text{Difference}$$

2. Graphic Arts (Printing & Publishing)

A similar QA check to that employed for the automobile refinishers was employed for the graphic arts area source category. Another EIIP area source document provides a population-based emission factor of 0.00065 TPY VOC per capita.[31] This factor does not include VOC emissions from graphic arts facilities with emissions of VOC > 100 TPY, i.e. from sources with actual VOC emissions above the major source threshold. Also, the EIIP document includes a number of cautions in applying the population-based emissions factor, particularly noting that there is considerable variability when looking at graphic arts emissions in a relatively small geographic area. This makes sense when considering the nature of this source category. Although there are numerous small printing and publishing operations in Huntsville, there are no large facilities. Very large printing jobs are probably sent elsewhere (perhaps Nashville?). Areas that contain such "regional" facilities would be expected to have higher than average per capita VOC emissions, whereas areas such as Huntsville, with no such facilities, would be expected to have lower than average per-capita VOC emissions from graphic arts area sources. [Note that the EIIP emissions factor explicitly excludes facilities with emissions greater than 100 TPY, but a graphic arts operation could be quite large, and serve as a "regional" facility in the sense the term is here used, and still have emissions below 100 TPY.]

These considerations might help explain the results of application of the per capita VOC emissions factor from graphic arts when applied to the City of Huntsville.

$$(158{,}216)\ (0.00065 \text{ TPY per capita}) = 102.8 \text{ TPY}$$

This compares with the printing and publishing total of 48.6 TPY shown in Table XV. The relative difference for this source category is thus very large.

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[30] National population information was taken from the Dept. of Commerce, US Census Bureau, Internet Release date: December 28, 2000 and is based on the 2000 census. Huntsville's population was taken from a supplement to the Huntsville Times on June 30, 2002 that summarized Huntsville information gleaned from the 2000 census.

[31] *Area Sources: Preferred and Alternative Methods; EIIP Volume III*; USEPA OAQPS; EPA-454/R-97-004c; July 1997.

$$(48.6 \text{ TPY} - 102.8 \text{ TPY}) \div (48.6 \text{ TPY}) (100) = -111.5 \%$$

Given the large sample of printing and publishing sources included in the DNR area source emissions inventory development project, the VOC emissions estimate of 48.6 TPY developed for this source category is viewed as the more reliable.

C. Future HAP Emissions Inventory Work

In response to Region 4's solicitation for Air Toxics Characterization Project proposals in 2002,[32] DNR requested an additional $50,000 to continue and expand Hazardous Air Pollutant (HAP) emission inventory development begun under Huntsville's then-existing Air Toxics Grant.[33] This project was selected for funding over a two-year period, as requested by the City of Huntsville, with $25,000 to be awarded in each of the fiscal years 2003 and 2004.[34]

As described in the project proposal, Huntsville plans to build on the success of the HAP emissions characterization efforts to date and improve both the scope and the quality of the existing HAP emissions inventory. Pursuant to that end, there are current plans to conduct detailed mobile source modeling using the newly developed Mobile 6.1 and 6.2 emission models. In addition to providing an updated mobile source HAP inventory for the year 2001 using the new models, DNR will repeat the modeling for 1999, allowing a direct comparison of the new model results with those obtained using Mobtox 5b and Part 5. Additional detail regarding the planned mobile source modeling effort is included in the Air Toxics Characterization Grant Proposal referenced in Footnote 37, *supra.*

Additional Quality Assurance activities for the existing area source inventory are also planned. Huntsville has now gathered detailed information on a number of area source categories. Detailed data have been obtained for a subset of the entire source population within each area source category, and these data have been used to extrapolate HAP emissions from the source category as a whole. Although it is clearly not feasible to examine every one of these facilities in detail, the approach employed has two possible weaknesses. First, much of the information collected reflects the somewhat sluggish economic conditions existing in 2001. How valid are the estimates obtained during an economic slow-down? Second, are the quantities and types of HAP emissions from the facilities selected for detailed review actually typical of the source category as a whole? Huntsville plans to answer these questions by "tweaking the inventory."

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[32] Reference the letter from Mr. Doug Neeley dated March 22, 2002 to State and Local Air Directors in Region 4 soliciting proposals for the award of § 105 Grant funds for use in Air Toxics Characterization projects.

[33] Reference the Air Toxics Characterization Project Proposal forwarded under cover of D. Shea's transmittal letter to Mr. Doug Neeley, EPA Region 4, dated April 15, 2002.

[34] Reference the letter from Mr. Doug Neeley to D. Shea dated May 15, 2002.

In an effort to get some idea of annual fluctuations in emissions from these unregulated area source categories, DNR will conduct follow-up inspections of a number of the facilities included in the initial evaluation and obtain updated materials usage information. It is hoped that this activity will not be as time consuming as it proved to be initially, i.e. during the data-gathering phase of the current project, which required numerous follow-ups. It shouldn't be, since DNR is now armed with the benefit of hindsight. Because this component of the quality assurance effort is adequately served by examining the emissions from facilities that were able to produce detailed information most readily in the initial effort, they will be selected for follow-up visits. This approach comports with the adage "no good deed goes unpunished." This will answer the first question.

To answer the second question, information will be obtained from some facilities not previously evaluated. This will serve as a check on the validity of the extrapolations used to develop the initial unregulated area source inventory, both with respect to types and quantities of HAPs emitted. Based on the results of these QA evaluations, DNR will determine if adjustments to the initial unregulated area source HAP emission estimates should be made.

Also, Huntsville plans to perform a detailed analysis of HAP emissions from Publicly Owned Treatment Works (POTWs), using actual operational data, measured waste stream HAP data, and the emission model WATER9, thereby adding another area source category to the existing HAP inventory. The Air Toxics Characterization Grant Proposal referenced in Footnote 37, *supra,* provides additional detail on the planned effort to model POTW HAP emissions, and includes a description of the unit operations at each of the facilities in the City of Huntsville.

Finally, note that Huntsville's commitment to update the existing HAP stationary and area source emissions inventories through 2001, another element of the 2003-2004 Air Toxics Characterization Grant project proposal, is satisfied by submittal of this document.

D. Air Toxics Characterization Project Benefits To Date

It should be evident that completion of the project described in this report was time consuming, and somewhat more resource intensive than originally envisioned. Significant benefits have resulted from this work, however, and the effort has been worthwhile. These benefits include significant improvements to the HAP emissions inventory for Huntsville, and concomitant improvements to the area source component of the criteria pollutant emissions inventory. Improved staff expertise in mobile source emissions modeling was also gained by the Division as a result of this project (reference the companion volume to this report cited in Footnote 10, supra). This could prove to be invaluable in the event Huntsville exceeds the revised NAAQS for ozone or the fine particulate standard over the next few years. DNR expanded the Huntsville Biennial Air Quality Report to include a section on HAP emissions, including a HAP emissions inventory, and this will hopefully promote public awareness and make information more

readily accessible to the general public. The dispersion modeling has served to expand DNR's understanding of potential problems with ambient HAP exposure resulting from area source emissions.

All of the preceding benefits are directly related to the work conducted under the scope of this project, and were expected. There have been other benefits to Huntsville's air program, however. Due to a series of federal reductions in Grant funding during the mid-1990's, the Division of Natural Resources had to eliminate a number of "discretionary" program activities, and focus almost exclusively on mandatory program elements. This allowed less time for doing exploratory inspections, in which inspectors spent a certain amount of time "beating the bushes" to determine whether regulated activity was being conducted below the Division's radar screen. As a result, there was a certain uneasiness that some facilities that should hold Air Permits had "fallen through the cracks." In conjunction with the field activities conducted pursuant to the Air Toxics Characterization Project, DNR inspectors visited a large number of establishments, and performed informal inspections of a number of industrial facilities as well as the area sources that were the principal focus of the study. There were no dramatic surprises with respect to emissions levels. The increased field presence made possible (and necessary) by the project is viewed as an ancillary benefit to the community.

Finally, in recognition of the need to better manage the data generated during the course of this project, DNR developed and has implemented a new data management system. This has provided a number of benefits to Huntsville's Air Program as a whole. The use of Access to house the data allows for interface with spreadsheet programs (Excel), which in turn allows export of data from the inventory for external manipulation. The ability of the system to produce customized reports and the capability to make sophisticated searches of the database will reap myriad benefits. As an example, DNR was asked to prepare an inventory for use in a recent ADEM PSD (Prevention of Significant Deterioration) increment analysis, and was able to generate the requested report with relatively little effort. In the past, such customized reports had to be prepared by manually extracting information from the database. The ability to extract information on specific pollutants, or on specific source categories, will be invaluable in SIP development in the event Huntsville is designated non-attainment in the coming years. The ability to easily expand the system to accommodate fine particulate matter precursor emissions is also viewed as a significant improvement over the previous data management system. The new system is expected to facilitate data exchange with ADEM and with EPA Region 4 over the coming years, and to streamline compliance with the Consolidated Emissions Reporting Rule requirements. The full benefits of the new data management system will only be fully appreciated over time, but clear advantages are already apparent.

Thus, the benefits of the Air Toxics Characterization Grant project extend well beyond the arena of Hazardous Air Pollutant emissions inventory development. The project has conferred substantial benefits on the air program as a whole, and for the Huntsville community.